Mathematics 2260H – Geometry I: Euclidean geometry
TRENT UNIVERSITY, Winter 2011

Problem Set #5
Parallels and triangles
Due on Monday, 14 February, 2011.

Recall that two lines in a plane are said to be *parallel* if they do not intersect in a point. With this assignment, we will start working with equivalents of the parallel axiom, *i.e.* Euclid's Postulate V, here slightly rephrased:

Postulate V. *If a straight line falling on two straight lines makes the sum of the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that same side.*

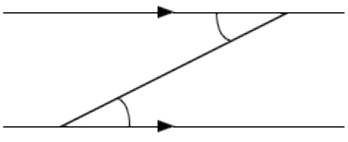
For one, we will consider the most common equivalent:

Playfair's Postulate. *Given a line and a point not on this line, there is a unique line passing through the given point which does not intersect the given line.*

We will also consider two other equivalents:

Triangle Postulate. *The sum of the interior angles of any triangle is exactly two right angles.*

Postulate Z. *Two given lines are parallel if and only if whenever a point on one given line is connected to a point on the other line, the alternating angles are equal.*



This time around, your tasks are to:

1. Show that Postulate Z implies Playfair's Postulate. *[6]*
2. Show that Postulate Z implies the Triangle Postulate. *[6]*
3. Show that the Triangle Postulate implies Postulate Z. *[8]*